In the Claims:

1. (original) A rotary position measuring system in accordance with the interferential operating principle, comprising:

a housing;

a scanning unit connected with the housing and comprising a light source that emits beams of light and a detector element;

a reflection scanning graduation structure arranged directly on the housing opposite the scanning unit;

a graduated disk that is connected with a rotatable shaft and comprising a radial transmission measuring graduation structure, wherein the graduated disk is arranged so it is rotatable around an axis of symmetry in the housing so that the measuring graduation structure is located between the scanning unit and the scanning graduation structure; and

wherein the beams of light emitted by the light source first reach the measuring graduation structure where they are split into a first set of diffracted partial beams of different orders, the diffracted partial beams impinge on the scanning graduation structure, where under reflection a second set of diffracted partial beams of different orders results and a back-reflection of the second set of diffracted partial beams in the direction toward the measuring graduation structure results, where the second set of diffracted partial beams interfere with one another and the detection of interfering partial beams takes place by the detector element.

2. (currently amended) The rotary position measuring system in accordance with claim 1, wherein said scanning graduation structure is arranged on a part of the housing which is ~~oscillation~~ insensitive against oscillations.

3. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is fastened flat on the housing.

4. (original) The rotary position measuring system in accordance with claim 2, wherein the scanning graduation structure is fastened flat on the housing.

5. (original) The rotary position measuring system in accordance with claim 3, wherein the scanning graduation structure is fastened by gluing on the housing.

6. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is only arranged in one segment of a circle.

7. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is arranged in a circular ring on the housing.

8. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is an integral part of the housing.

9. (original) The rotary position measuring system in accordance with claim 8, wherein the scanning graduation structure is formed as an etched structure on the housing.

10. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is formed as a stamping on a thin foil, and the foil is arranged flat on the housing.

11. (original) The rotary position measuring system in accordance with claim 1, wherein a screen structure in the form of an absorbent layer is arranged adjacent to the scanning graduation structure.

12. (original) The rotary position measuring system in accordance with claim 1, wherein the housing is designed in a cylinder shape and comprises a flange on which the scanning graduation structure is arranged.

13. (original) The rotary position measuring system in accordance with claim 1, wherein the measuring graduation structure comprises a phase grating with alternatingly arranged bars and gaps, and wherein either $b_{SM} = 1/3\ TP_M$ or $b_{SM} = 2/3\ TP_M$ applies for the bar width b_{SM}, wherein TP_M identifies the graduation period of the phase grating.

14. (original) The rotary position measuring system in accordance with claim 13, wherein the bar height of the measuring graduation structure, h_{SM}, is defined by the equation h_{SM}

$(n-1) = \lambda/3$, wherein n identifies the refractive index of the bar material, while λ identifies the wavelength of the light source used.

15. (original) The rotary position measuring system in accordance with claim 14, wherein the scanning graduation structure comprises a phase grating with alternatingly arranged bars and gaps, and the bar width b_{SA} equals the gap width b_{LA}.

16. (original) The rotary position measuring system in accordance with claim 15, wherein the bar height of the scanning graduation structure, h_{SA}, is defined by the equation $h_{SA} = \lambda/4$, wherein λ identifies the wavelength of the light source used.

17. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning unit is arranged on a circular plate which is connected via lateral housing walls with the housing.

18. (original) The rotary position measuring system in accordance with claim 1, wherein the scanning graduation structure is arranged on a compensating body on the housing, and the compensating body is connected in a manner fixed against relative twisting and radially displaceable with the housing.

19. (previously added) The rotary position measuring system in accordance with claim 1, wherein the measuring graduation structure is radially symmetrically arranged around the axis of symmetry.

20. (new) The rotary position measuring system in accordance with claim 1, wherein

B2 tilting or tumbling of said scanning graduation structure with respect to said measuring graduation structure does not affect a position of position-dependent signals received by said detector element.